

I Claim

Sub A1 1 An article of manufacture comprising a substrate and an antimicrobial polymer coating wherein the polymer coating comprises one or more polymers and a colloid wherein the colloid comprises salts of one or more oligodynamic metals

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Sub B1 2. The article of Claim 1 wherein the substrate is a medical device.

3. The article of Claim 2 wherein the medical device comprises a catheter, an endotracheal tube, a tracheostomy tube, a wound drainage device, a wound dressing, a stent, an implant, an intravenous catheter, a medical adhesive, a suture, a shunt, a glove, a condom, a contact lens, a gastrostomy tube, medical tubing, cardiovascular products, heart valves, pacemaker leads, a guidewire, or urine collection devices.

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Sub B2 4. The article of Claim 3 wherein the medical device is a catheter.

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Sub A1 5. The article of Claim 1 wherein the polymer comprises one or more hydrophilic polymers that are soluble in water or in an organic solvent containing water, one or more a hydrophobic polymers, or a combination of both hydrophilic and hydrophobic polymers

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Sub A7

6. The article of Claim 5 wherein the hydrophilic polymer is selected from the group consisting of polyurethanes, polyvinylpyrrolidones, polyvinyl alcohols, polyethylene glycols, polypropylene glycols, polyoxyethylenes, polyacrylic acid, polyacrylamide, carboxymethyl cellulose, dextrans, polysaccharides, starches, guar, xantham and other gums, collagen, gelatins, biological polymers, and mixtures and copolymers thereof.

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7. The article of Claim 5 wherein the hydrophobic polymer is selected from the group consisting of polytetrafluoroethylene, polyvinyl chloride, polyvinylacetate, poly(ethylene terephthalate), silicone, polyesters, polyamides, polyureas, styrene-block copolymers, polymethyl methacrylate, polyacrylates, acrylic-butadiene-styrene copolymers, polyethylene, polystyrene, polypropylene, natural and synthetic rubbers, acrylonitrile rubber, cellulose, and mixtures, derivatives, and copolymers thereof.

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8. The article of Claim 1 wherein the colloid comprises at least one silver salt.

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9. The article of Claim 8 wherein the silver salt is selected from the group selected from the group consisting silver chloride, silver iodide, silver citrate, silver lactate, silver acetate, silver propionate, silver salicylate, silver bromide, silver ascorbate,

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silver laurel sulfate, silver phosphate, silver sulfate, silver oxide, silver benzoate, silver carbonate, silver sulfadiazine, and silver gluconate.

10. The article of Claim 1 wherein the colloid comprises the salt
5 of more than one oligodynamic metal.

11. The article of Claim 10 wherein the oligodynamic metal salts
comprise salts having different solubilities in water.

12. The article of Claim 11 wherein the oligodynamic metal salts
comprise silver lactate, silver acetate, silver citrate, silver
10 chloride, and silver iodide.

13. An article of manufacture comprising one or more polymers
and a colloid wherein the colloid comprises salts of one or
more oligodynamic metals.

14. A composition comprising a polymer and a colloid wherein
15 the colloid comprises salts of one or more oligodynamic
metals.

15. The composition of Claim 14 wherein the colloid comprises at
least one silver salt.

16. The composition of Claim 15 wherein the silver salt is
20 selected from the group selected from the group consisting
silver chloride, silver iodide, silver citrate, silver lactate,
silver acetate, silver propionate, silver salicylate, silver

bromide, silver ascorbate, silver laurel sulfate, silver phosphate, silver sulfate, silver oxide, silver benzoate, silver carbonate, silver sulfadiazine, and silver gluconate.

17. The composition of Claim 14 wherein the colloid comprises
5 the salt of more than one oligodynamic metal.

18. The composition of Claim 17 wherein the oligodynamic metal salts comprise salts having different solubilities in water.

19. The composition of Claim 18 wherein the oligodynamic metal salts comprise silver lactate, silver acetate, silver citrate,
10 silver chloride, and silver iodide.

20. The composition of Claim 14 wherein the polymer comprises
one or more hydrophilic polymers that are soluble in water
or in an organic solvent containing water, one or more
hydrophobic polymers, or a combination of both hydrophilic
15 and hydrophobic polymers.

21. The composition of Claim 20 wherein the hydrophilic polymer is selected from the group consisting of polyurethanes, polyvinylpyrrolidones, polyvinyl alcohols, polyethylene glycols, polypropylene glycols, polyoxyethylenes, polyacrylic acid, polyacrylamide, carboxymethyl cellulose, dextrans, polysaccharides, starches,
20 guar, xantham and other gums, collagen, gelatins, biological polymers, and mixtures and copolymers thereof.

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22. The composition of Claim 20 wherein the hydrophobic polymer is selected from the group consisting of polytetrafluoroethylene, polyvinyl chloride, polyvinylacetate, poly(ethylene terephthalate), silicone, 5 polyesters, polyamides, polyureas, styrene-block copolymers, polymethyl methacrylate, polyacrylates, acrylic-butadiene-styrene copolymers, polyethylene, polystyrene, polypropylene, natural and synthetic rubbers, acrylonitrile rubber, cellulose, and mixtures, derivatives, and copolymers 10 thereof.

23. A process for the manufacture of an antimicrobial composition comprising the steps of:

- forming a solution, dispersion, or combination thereof of one or more polymers;
- forming in the polymer solution a colloid comprising contacting
 - a solution of salt A which comprises one or more salts of oligodynamic metals, and
 - a solution of salt B which comprises additional salts that reacts with salt A to form a fine colloidal precipitate.

24. The process of Claim 23 wherein the colloid in step (b) is formed separately and then combined with the polymer solution.

25. The process of Claim 23 wherein the colloid is formed *in situ* in the polymer solution.

26. The process of Claim 23 wherein salt A comprises salts of metals selected from the group consisting of silver, platinum, gold, zinc, copper, cerium, gallium, palladium, rhodium, iridium, ruthenium, and osmium.

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27. The process of Claim 23 wherein salt B comprises anions selected from the group consisting of acetates, ascorbates, benzoates, bitartrates, bromides, carbonates, chlorides, citrates, folates, gluconates, iodates, iodides, lactates, laurates, oxalates, oxides, palmitates, perborates, phenosulfonates, phosphates, propionates, salicylates, stearates, succinates, sulfadiazines, sulfates, sulfides, sulfonates, tartrates, thiocyanates, thioglycolates, and thiosulfates.

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28. The process of Claim 23 wherein salt B comprises cations selected from the group consisting of calcium, sodium, lithium, aluminum, magnesium, potassium, and manganese.

29. The process of Claim 23 wherein the colloid formed in step
20 (b) comprises at least one silver salt.

30. The process of Claim 29 wherein the silver salt is selected from the group consisting of silver chloride, silver iodide, silver citrate, silver lactate, silver acetate, silver propionate,

silver salicylate, silver bromide, silver ascorbate, silver laurel sulfate, silver phosphate, silver sulfate, silver oxide, silver benzoate, silver carbonate, silver sulfadiazine, and silver gluconate.

5 31. The process of Claim 23 wherein the colloid formed in step
(b) comprises salts having different solubilities in water.

32. The process of Claim 31 wherein the colloid formed in step
(b) comprises silver lactate, silver acetate, silver citrate, silver chloride, and silver iodide.

10 33. The process of Claim 23 wherein the polymer is a hydrophilic polymer, one or more a hydrophobic polymers, or a combination of both hydrophilic and hydrophobic polymers.

34. The process of Claim 23 wherein the polymer solution is
15 formed by dissolving the polymer supercritical liquids.

35. A method for the manufacture of an article comprising dipping or spraying a substrate with a coating composition wherein the coating composition comprises polymers, monomers, or any combination thereof, and a colloid comprising salts of one or more oligodynamic metals.

20 36. A method for the manufacture of an article comprising the steps of

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1) forming a solution, dispersion, or combination thereof of more or more polymers containing a colloid wherein the colloid comprises salts of one or more oligodynamic metals; and

5 2) drying the solution to create a solid polymeric article.

37. A method for the manufacture of an article comprising the steps of

10 1) forming a composition that comprises a solution, dispersion, or combination thereof of one or more polymers containing a colloid wherein the colloid comprises salts of one or more oligodynamic metals;

2) drying the composition; and

3) processing the composition with the application of heat to form the article.

15 38. A method for the manufacture of an article comprising the steps of

1) forming a composition that comprises solution, dispersion, or combination thereof of one or more polymers containing a colloid wherein the colloid comprises salts of one or more oligodynamic metals;

20 2) compounding the composition formed in step (1) with one or more polymers; and

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3) processing the composition formed in step (2) with the application of heat to form the article.

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A method for the manufacture of an article comprising dipping a form in a composition comprising polymers, monomers, or any combination thereof, and a colloid comprising salts of one or more oligodynamic metals.

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40. A method for the manufacture of an article comprising casting a composition comprising polymers, monomers, or any combination thereof, and a colloid comprising salts of one or more oligodynamic metals.

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